

# Fisher® 846 Electro-Pneumatic Transducer

The Fisher 846 electro-pneumatic transducer is a rugged, field-mountable transducer that accepts an electrical input signal and converts it to a pneumatic output signal. Typically, the 4 to 20 mA is converted to 0.2 to 1.0 bar (3 to 15 psi). In the most common application, the transducer converts an electrical output signal from a controller to a pneumatic signal necessary to operate a control valve actuator or pneumatic positioner.

The transducer includes a deflector/nozzle design (figure 1) that consists of two nozzles positioned so that the constant air flow exiting the supply nozzle is directed at the entrance of the receiver nozzle. Each nozzle has a large bore of 0.41 mm (0.016 inches), which provides good resistance to plugging. The input current signal positions a deflector bar within the

nozzle's flow stream. As the input signal changes, the deflector bar moves to alter the flow stream to the receiver nozzle, establishing a pilot pressure at the receiver nozzle. The pilot pressure, in turn, controls the booster stage and output of the transducer.

An electronic feedback control network constantly compares the value of the pneumatic output signal with the input current signal. A solid-state pressure sensor is part of the electronics package monitoring the pneumatic output (figure 3). A comparator circuit in the control network detects input-output deviations and adjusts the output by moving the deflector in the pilot stage to a corrected position. Because of this feedback network, the transducer can correct for error-producing effects such as variations in supply pressure and downstream leakage.



X0234

**FISHER 846 ELECTRO-  
PNEUMATIC TRANSDUCER**



W6307-1

**846 MOUNTED  
ON FISHER 667 ACTUATOR**



## Specifications

### Input Signal

4-20 mA DC, field adjustable split ranging

### Equivalent Circuit

See figure 4

### Output Signal

**Standard Performance:** ■ 0.2 to 1.0 bar (3 to 15 psi).  
Rangeability between 0.1 to 1.2 bar (1 and 18 psi)  
**Multirange Performance:** ■ 0 to 1.2 bar (0 to 18 psi),  
■ 0.4 to 2.0 bar (6 to 30 psi), and ■ 0 to 2.3 bar (0 to  
33 psi) nominal ranges. Actual rangeability available  
between 0.03 to 2.3 bar (0.5 and 33 psi)  
**Action:** ■ Direct (increasing input signal increases  
transducer output) (Minimum span, 6 psi) or  
■ Reverse (increasing input signal decreases  
transducer output) (Minimum span, 11 psi)

### Supply Pressure

**Standard Performance:** 1.2 to 1.6 bar  
(18 to 24 psi)  
**Multirange Performance:**  
Minimum: 0.2 bar (3 psi) [0.14 bar (2 psi) for a 2.3 bar  
(33 psi) output] greater than the maximum calibrated  
output pressure.  
Maximum: 2.4 bar (35 psi)

### Supply Pressure Medium

Clean, dry air

Per ISA Standard 7.0.01

A maximum 40 micrometer particle size in the air  
system is acceptable. Further filtration down to 5  
micrometer particle size is recommended. Lubricant  
content is not to exceed 1 ppm weight (w/w) or  
volume (v/v) basis. Condensation in the air supply  
should be minimized.

Per ISO 8573-1

*Maximum particle density size:* Class 7

*Oil content:* Class 3

*Pressure Dew Point:* Class 3 or at least 10°C less than  
the lowest ambient temperature expected

### Maximum Steady-State Air Consumption<sup>(1)</sup>

0.3 m<sup>3</sup>/hr (12 scfh) at 1.4 bar (20 psi) supply pressure

### Output Air Capacity<sup>(1)</sup>

**Standard Performance:** 6.4 m<sup>3</sup>/hr (240 scfh) at  
1.4 bar (20 psi) supply pressure

**Multirange Performance:** 9.7 m<sup>3</sup>/hr (360 scfh) at  
2.5 bar (35 psi) supply pressure

### Temperature Limits

**Operating:** -40 to 85°C (-40 to 185°F)  
**Storage:** -40 to 93°C (-40 to 200°F)

### Humidity Limits

0-100% condensing relative humidity

### Performance<sup>(2)</sup>

**Linearity, Hysteresis, and Repeatability:** ± 0.3% of  
span

**Temperature Effect (total effect including zero and  
span):** ± 0.07%/°C (0.045%/°F) of span

**Vibration Effect:** ± 0.3% of span per g during the  
following conditions:

5-15 Hz at 4 mm constant displacement

15-150 Hz at 2 g, 150-2000 Hz at 1 g.

per SAMA Standard PMC 31.1, Sec. 5.3, Condition 3,  
Steady State

**Shock Effect:** ± 0.5% of span, when tested per SAMA  
Standard PMC 31.1, Sec. 5.4

**Supply Pressure Effect:** Negligible

**Electromagnetic Interference (EMI):** Tested per IEC  
61326-1 (Edition 1.1). Meets emission levels for Class  
A equipment (industrial locations) and Class B  
equipment (domestic locations). Meets immunity  
requirements for industrial locations (Table A.1).  
Immunity performance is shown in table 1.

**Leak Sensitivity:** Less than 1.0% of span for up to  
4.8 m<sup>3</sup>/hr (180 scfh) downstream leakage

**Overpressure Effect:** Less than 0.25% of span for  
misapplication of up to 7.0 bar (100 psi) supply  
pressure for less than 5 minutes to the input port

**Reverse Polarity Protection:** No damage occurs from  
reversal of normal supply current (4-20 mA) or from  
misapplication of up to 100 mA

### Connections

**Supply and Output Pressure:** 1/4-18 NPT internal  
connection

**Electrical:** 1/2-14 NPT internal conduit connection

- continued -

## Specifications (Continued)

### Adjustments

Zero and Span: Screwdriver adjustments located in terminal compartment.

### Remote Pressure Reading (optional)

ON or OFF; jumper selectable  
Frequency Range: 0-10,000 Hz  
Amplitude: 0.4-1.0 V<sub>p-p</sub>

### Required Operating Voltage

Min. 6.0 V (at 4 mA)  
Max. 7.2 V (at 20 mA)  
with Remote Pressure Reading ON  
Min. 6.4 V (at 4 mA)  
Max. 8.2 V (at 20 mA)

### Electrical Classification<sup>(3)</sup>

Hazardous Area  
(see Bulletin 9.2:001, D103222X012)  
CSA C/US—Intrinsically Safe, Explosion-proof,  
Non-Incendive  
FM—Intrinsically Safe, Explosion-proof,  
Non-Incendive  
ATEX—Intrinsically Safe, Flameproof, Type n  
IECEX—Intrinsically Safe, Flameproof

### Electrical Housing

Tropicalization (Fungus test per MIL-STD-810)  
CSA C/US—Type 4X  
FM—Type 4X  
ATEX—IP66<sup>(4)</sup>  
IECEX—IP66<sup>(4)</sup>

### Other Classifications/Certifications

CUTR—Customs Union Technical Regulations  
(Russian, Kazakhstan, and Belarus)  
INMETRO—National Institute of Metrology, Quality,  
and Technology (Brazil)  
KGS—Korea Gas Safety Corporation (South Korea)  
NEPSI—National Supervision and Inspection Centre  
for Explosion Protection and Safety of  
Instrumentation (China)

Contact your [Emerson Process Management sales office](#) for classification/certification specific information



### Construction Materials

Housing: ■ Low-copper aluminum with polyurethane paint, or ■ CF8M  
O-Rings: Nitrile, except silicone for sensor O-rings.

### Mounting

■ Actuator, ■ pipestand, or ■ surface

### Weight

Aluminum: 2.9 kg (6.5 lb) excluding options  
Stainless Steel: 6.7 kg (14.8 lb) excluding options

### Options

■ Fisher 67CFR filter regulator, ■ supply and output gauges, ■ remote pressure reading, or ■ stainless steel mounting bracket

NOTE: Specialized instrument terms are defined in ANSI/ISA Standard 51.1 - Process Instrument Terminology

1. Normal m<sup>3</sup>/hr: normal cubic meters per hour (m<sup>3</sup>/hr, 0°C and 1.01325 bar, absolute). Scfm: standard cubic feet per minute (ft<sup>3</sup>/min, 60°F and 14.7 psig).

2. Performance values are obtained using a transducer with a 4 to 20 mA dc input signal, a 3 to 15 psig output, and 20 psig supply pressure.

3. Refer to tables 2, 3, 4, and 5 for additional information.

4. ATEX and IECEX Flameproof — IP66 per CSA Letter of Attestation.

**Table 1. EMC Immunity Performance Criteria**

Port	Phenomenon	Basic Standard	Test Level	Performance Criteria <sup>(1)</sup>
Enclosure	Electrostatic discharge (ESD)	IEC 61000-4-2	4 kV contact 8 kV air	A
	Radiated EM field	IEC 61000-4-3	80 to 1000 MHz @ 10V/m with 1 kHz AM at 80% 1400 to 2000 MHz @ 3V/m with 1kHz AM at 80% 2000 to 2700 MHz @ 1V/m with 1kHz AM at 80%	A
I/O signal/control	Burst (fast transients)	IEC 61000-4-4	1 kV	A
	Surge	IEC 61000-4-5	1 kV (line to ground only, each)	B
	Conducted RF	IEC 61000-4-6	150 kHz to 8 MHz at 3 Vrms	B
			8 MHz to 80 MHz at 3 Vrms	A

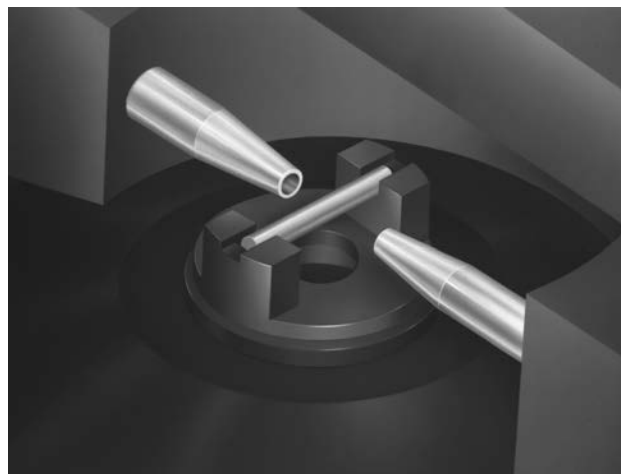
Specification limit = ±1% of span  
1. A = No degradation during testing. B = Temporary degradation during testing, but is self-recovering.

## Features

- **Vibration Resistant**—The low-mass pilot stage, mechanically damped deflector bar, and rugged construction provide stable performance in vibration.
- **Large Diameter Nozzles**—Large diameter nozzles, free-flow pilot stage design, and large internal pneumatic supply passages provide excellent tolerance to reducing the effects of contaminant buildup and erosion.
- **Increased Accuracy, Reduced Sensitivity to Supply Pressure Variations and Downstream Leakage**—The electronic feedback control network monitors the pneumatic output signal, detects any input-output deviations and corrects them. This provides very high accuracy and allows the transducer to sense changes in the final element condition and rapidly optimize its air delivery.
- **Easy Maintenance**—Major mechanical and electrical components are incorporated into a single field-replaceable “master module” (figure 2). The transducer does not have to be removed from its mounting to facilitate troubleshooting or service. A separate field wiring compartment eases installation and maintenance.
- **Quick Diagnostic Checks and Remote Performance Monitoring**—With *Stroke Port*, a constant bleed from the pilot stage vents through a hole in the module cover. Covering the hole increases the transducer output to confirm the proper operation of the pilot and booster stages and stroke the actuator. With optional *Remote Pressure Reading*, a frequency directly proportional to the output pressure is superimposed on the input signal wires.

Using a frequency counter, an operator can monitor the 846 output pressure.

Figure 1. Detail of Deflector/Nozzle Pilot Stage



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## Installation

The transducer may be actuator, wall, panel, or pipestand mounted. Dimensions are shown in figures 6, 7, and 8.

## Ordering Information

To determine what ordering information is required, refer to the specification table. Carefully review the description of each specification. Specify the desired choice whenever there is a selection available.

When ordering mounting parts, specify actuator, surface, or pipestand mounting. For actuator mounting, specify the actuator type, size, travel, and diaphragm pressure range. For all 657 and 667 actuators except size 80, specify whether actuator yoke or actuator casing mounting is desired (yoke mounting only is available on size 80 actuators).

Figure 2. Master Module Construction

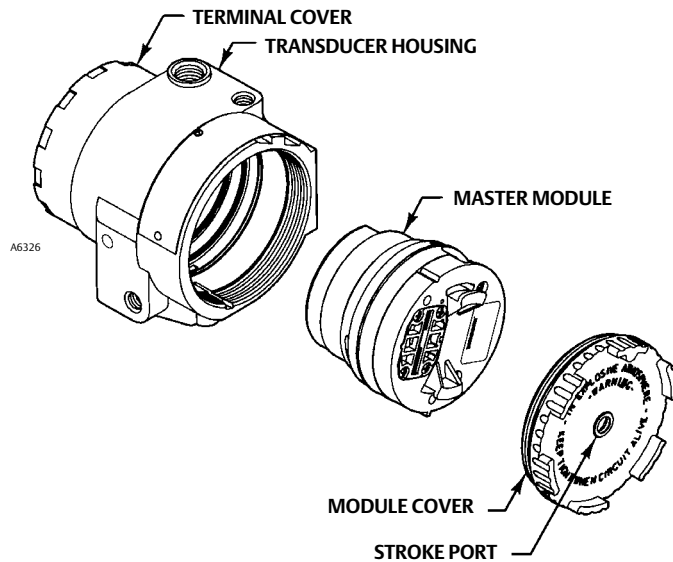


Figure 3. Functional Block Diagram

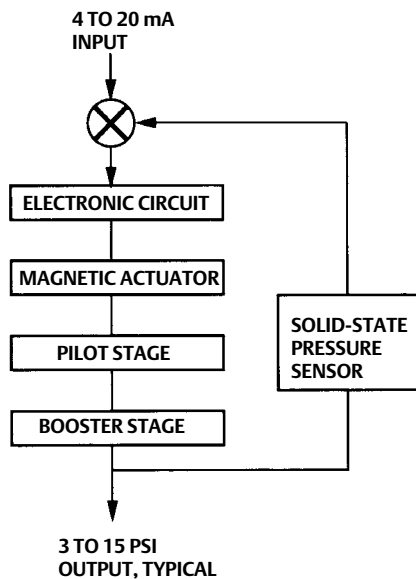
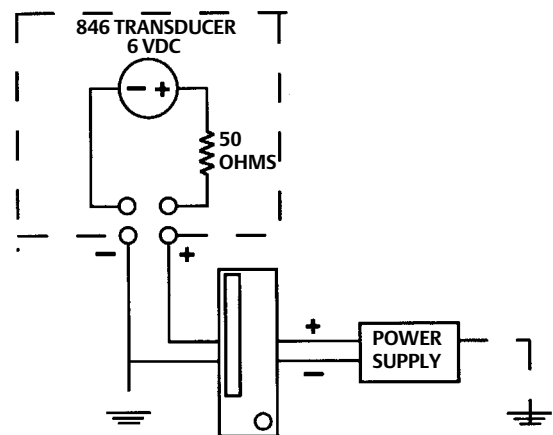


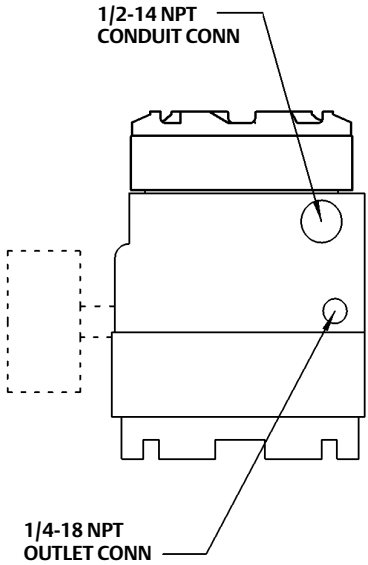
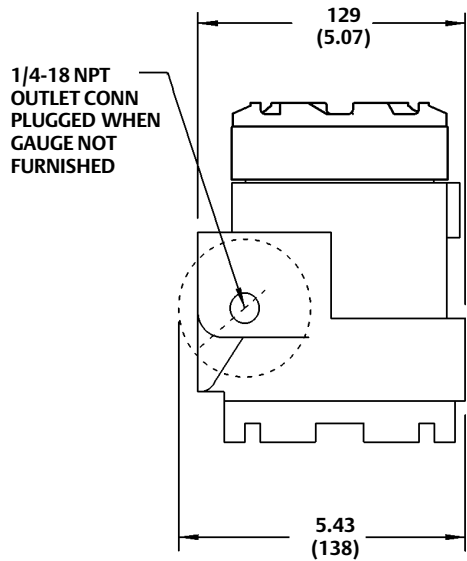
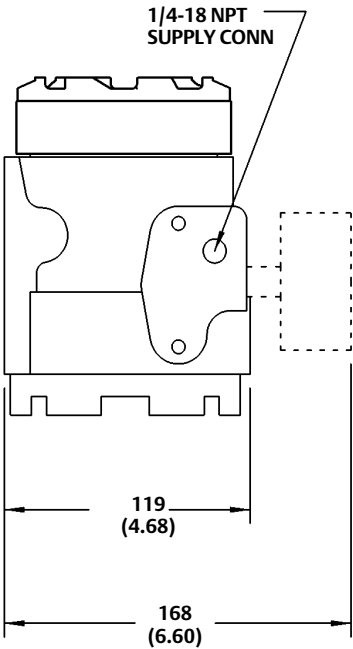
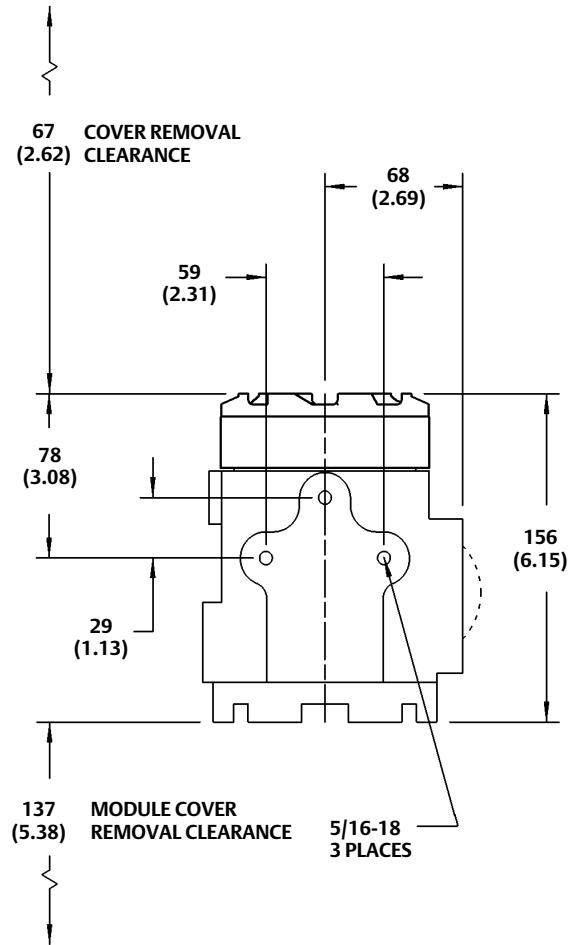
Figure 4. Equivalent Circuit



Note:  
The 846 is not a constant resistor in series with an inductor. It is better modeled in the loop as a 50 ohm resistor in series with a 6 volt DC voltage drop with negligible inductance.

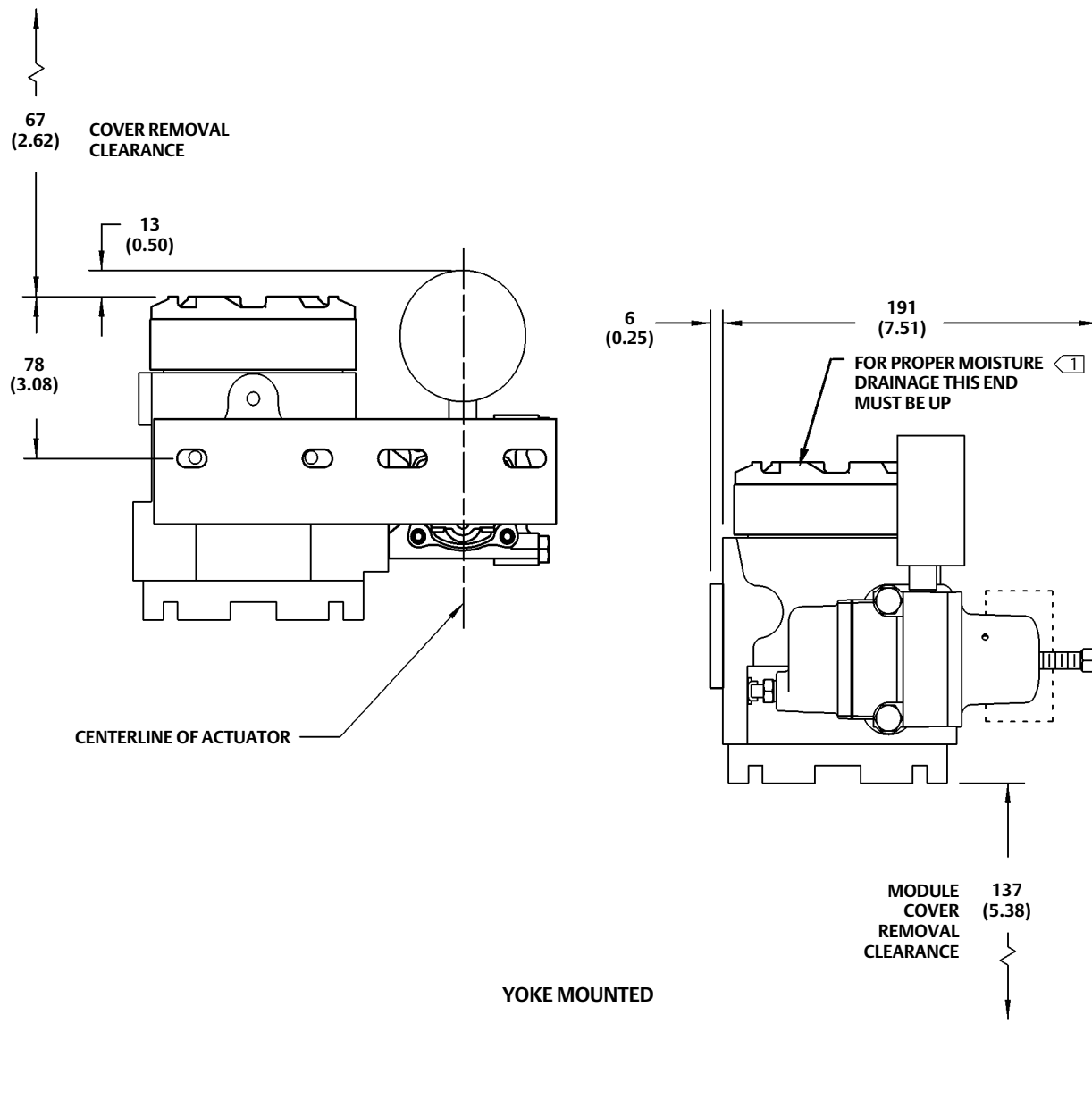
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Figure 5. Dimensions



mm  
(INCH)

Figure 6. Dimensions with Optional Fisher 67CFR Filter-Regulator (Yoke Mounted)

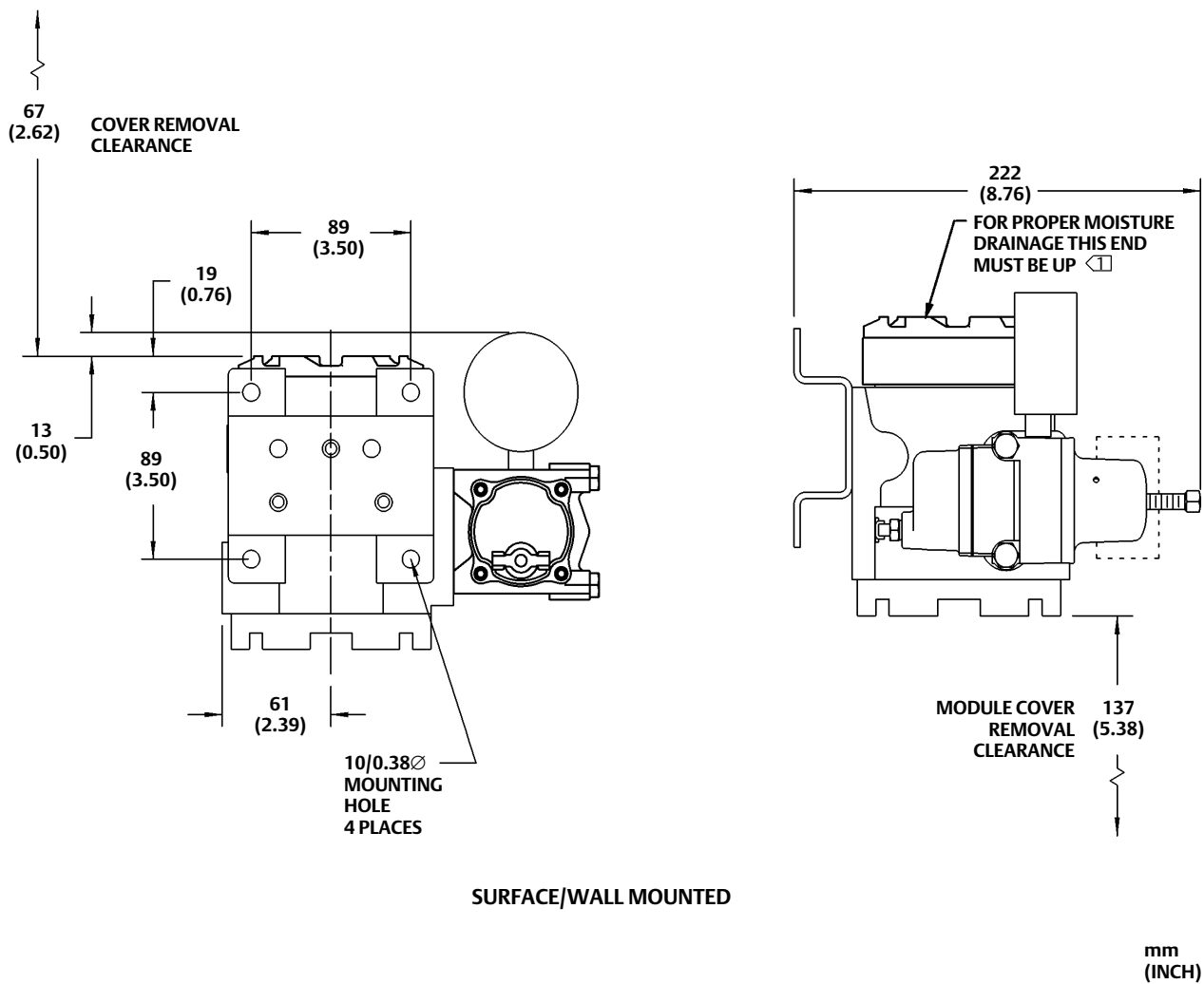


**Note:**

1 The mounting positions shown allow any moisture buildup in the terminal compartment to drain to the signal wire conduit entrance. Do not mount the transducer with the terminal compartment cover on the bottom; moisture may accumulate in the terminal compartment or pilot stage, preventing proper transducer operation. The vertical mount is most effective for moisture drainage in wet applications.

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Figure 7. Dimensions with Optional Fisher 67CFR Filter-Regulator (Surface/Wall Mounted)



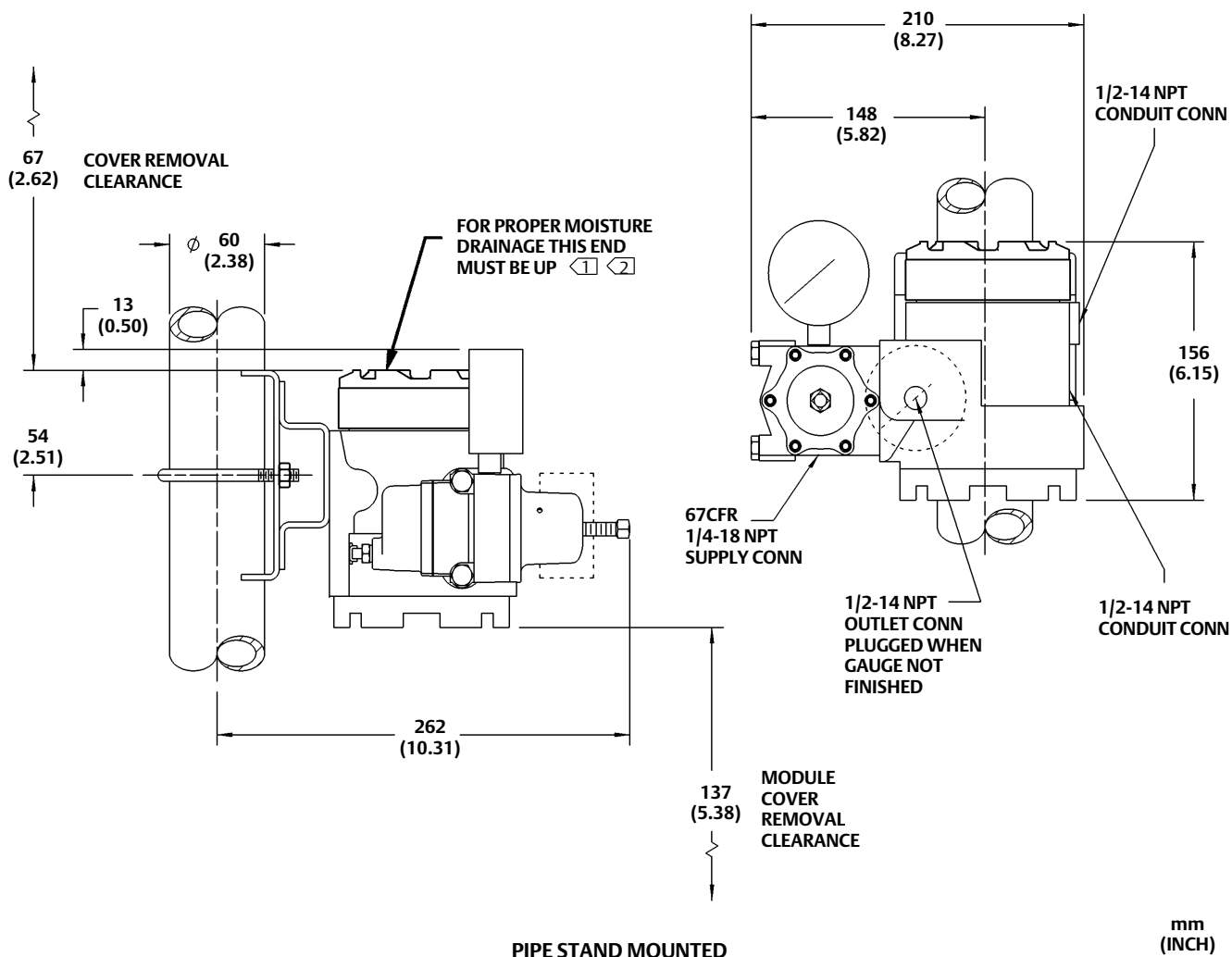
Note:

The mounting positions shown allow any moisture buildup in the terminal compartment to drain to the signal wire conduit entrance. Do not mount the transducer with the terminal compartment cover on the bottom; moisture may accumulate in the terminal compartment or pilot stage, preventing proper transducer operation. The vertical mount is most effective for moisture drainage in wet applications.

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Figure 8. Dimensions with Optional Fisher 67CFR Filter-Regulator (Pipe Stand Mounted)



**Notes:**

1 The mounting positions shown allow any moisture buildup in the terminal compartment to drain to the signal wire conduit entrance. Do not mount the transducer with the terminal compartment cover on the bottom; moisture may accumulate in the terminal compartment or pilot stage, preventing proper transducer operation. The vertical mount is most effective for moisture drainage in wet applications.

2 If mounted on horizontal pipe, the I/P must be on top of the pipe for proper moisture drainage.

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**Table 2. Hazardous Area Classifications for Canada—cCSAus**

Certification Body	Certification Obtained	Entity Rating	Temperature Code
CSA	Ex ia Intrinsically Safe Class I Division 1 Groups A,B,C,D T4 per drawing GE59146	V <sub>max</sub> = 30 VDC I <sub>max</sub> = 100 mA C <sub>i</sub> = 0.016 µF L <sub>i</sub> = 20 µH	T4 (T <sub>amb</sub> ≤ 60°C)
	XP Explosion-proof Class I Division 1 Groups C,D DIP Dust Ignition-proof Class II III Division I Groups E,F,G T4 NI Non-incendive Class I, Division 2, Groups A,B,C,D T4	---	T4 (T <sub>amb</sub> ≤ 60°C)

**Table 3. Hazardous Area Classification for United States—FM**

Certification Body	Certification Obtained	Entity Rating	Temperature Code
FM	IS Intrinsically Safe Class I, II, III Division 1 Groups A,B,C,D,E,F,G per drawing GE59147	V <sub>max</sub> = 30 VDC I <sub>max</sub> = 100 mA P <sub>max</sub> = 1.0 W C <sub>i</sub> = 0.016 µF L <sub>i</sub> = 20 µH	T4 (T <sub>amb</sub> ≤ 60°C)
	XP Explosion-proof Class I Division 1 Groups B,C,D DIP Dust Ignition-proof Class II, III Division I Groups EFG NI Non-incendive Class I Division 2 Groups A,B,C,D	---	T4 (T <sub>amb</sub> ≤ 60°C)

**Table 4. Hazardous Area Classifications—ATEX**

Certificate	Certification Obtained	Entity Rating	Temperature Code
ATEX	Intrinsically Safe ⊕ II 1 GD Gas Ex ia IIC T4,T5 Ga Dust Ex ia IIIC IP66 Da T90°C (T <sub>amb</sub> ≤ 80°C) Ex ia IIIC IP66 Da T50°C (T <sub>amb</sub> ≤ 40°C)	U <sub>i</sub> = 30 VDC I <sub>i</sub> = 100 mA P <sub>i</sub> = 1.0 W C <sub>i</sub> = 8 nF L <sub>i</sub> = 20 µH	T4 (T <sub>amb</sub> ≤ 80°C) T5 (T <sub>amb</sub> ≤ 40°C)
	Flameproof ⊕ II 2 G Gas Ex d IIB T5/T6 Gb	---	T5 (T <sub>amb</sub> ≤ 80°C) T6 (T <sub>amb</sub> ≤ 65°C)
	Type n ⊕ II 3 GD Gas Ex nA IIC T5/T6 Gc Dust Ex tc IIIC T88°C T <sub>500</sub> Dc IP66 Ex tc IIIC T77°C T <sub>500</sub> Dc IP66	---	T5 (T <sub>amb</sub> ≤ 85°C) T6 (T <sub>amb</sub> ≤ 74°C)

Table 5. Hazardous Area Classifications—IECEX

Certificate	Certification Obtained	Entity Rating	Temperature Code
IECEX	Intrinsically Safe Gas Ex ia IIC T4/T5 Ga	Ui = 40 VDC Ii = 200 mA Pi = 1.0 W Ci = 8 nF Li = 20 $\mu$ H	T4 (Tamb $\leq$ 80°C) T5 (Tamb $\leq$ 40°C)
	Flameproof Gas Ex d IIB T5/T6 Gb	---	T5 (Tamb $\leq$ 80°C) T6 (Tamb $\leq$ 65°C)

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